

Application No. 10/765,252
Amendment Dated June 8, 2005
In Reply to USPTO Office Action Dated February 24, 2005
Confirmation No. 9565
PPG Docket No. 1908A1

REMARKS

The application has been amended. In particular, claim 11 has been amended to correct a typographical error as identified in the Office Action, and independent claims 1, 10 and 20 have been amended to define the polyurethane polyol as including hydroxyl termination. Support for this amendment is provided throughout the specification, including paragraph [0018], where it is specifically noted that "The diisocyanate and the short chain aliphatic and long chain polymeric diols are reacted in such a way so as to result in a hydroxyl-terminated polyurethane polyol prepolymer." Accordingly, no new matter is added through this amendment. In view of the amendments above and the remarks below, reconsideration is respectfully requested.

In the Office Action, claims 1-6 and 8-9 have been rejected under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent No. 5,563,233 to Reich et al. (hereinafter "Reich"), and claims 7 and 10-23 have been rejected under 35 U.S.C. §103(a) as allegedly unpatentable over Reich. Each of these rejections is respectfully traversed.

The claimed invention is directed to unsymmetrical urethane polyol precursors, as well as coating compositions including the polyol precursors reacted with a polyisocyanate and substrates coated with such coating

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compositions. The polyol precursor represents an unsymmetrical trimeric polyol comprising the reaction product of a diisocyanate with two different diols. In particular, the diisocyanate is reacted with a short chain aliphatic diol having 1-6 carbons and a longer chain polymeric diol with 5-20 carbons and having an oxycarbonyl linkage. Since the polyol is formed by reaction with two different diols of different chain length, the urethane polyol is unsymmetrical, including a short chain moiety having hydroxy functionality and a long chain moiety having hydroxy functionality, both of which are linked together through urethane linkages derived from reaction with the diisocyanate. In this manner, the reaction product represents a polyol since it includes hydroxyl termination, which polyol can be further used as a precursor in a subsequent reaction with a polyisocyanate to form a crosslinked polyurethane polymer.

The Office Action alleges that "Reich teaches a coating composition, comprising a polyurethane polyol precursor comprising the reaction product of a diisocyanate;...a diol;...a polycarbonate diol; and water." Reich, however, fails to teach, disclose, or even remotely suggest the claimed urethane polyol precursor and in particular an unsymmetrical urethane polyol precursor, let alone a coating composition prepared as a reaction product of such a urethane polyol precursor and a polyisocyanate. Instead, Reich teaches conventional urethane polymer gels which are formed by reacting a diisocyanate with one or more diols in the

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presence of water thereby forming a polyurethane polymer, not a polyol precursor.

As set forth in the present claims, the trimeric urethane polyol of the present invention includes hydroxyl termination. This is achieved, for example, by reacting the diisocyanate with a stoichiometric excess of the aliphatic diol and the polymeric diol under anhydrous conditions, as discussed at paragraph [0018] and in the examples of the specification. Accordingly, the product of such a reaction is a trimeric urethane polyol prepolymer, which includes terminal hydroxyl groups linked through a urethane linkage. Reich fails in any way to teach or disclose a reaction to form such a polyol, which includes terminal hydroxyl groups.

In fact, there is nothing in Reich which teaches, discloses or even remotely suggests the formation of a trimeric urethane polyol based on the reaction of a diisocyanate with an aliphatic diol and a polymeric diol, let alone the use of such a urethane polyol in a coating composition. Instead, Reich involves conventional polyurethane polymerization through a diisocyanate-diol reaction in the presence of water.

For example, Reich teaches the formation of a tough polyurethane gel by reacting a diisocyanate with a polyoxyethylene glycol in the presence of water.

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The overall invention in Reich involves a critical selection of the amount of water in the reaction mixture. The use of water in such a reaction with a diisocyanate and diol, however, suggests complete polymerization of the polyurethane, as opposed to an anhydrous reaction mechanism, involving reacting a short chain diol with one end of a diisocyanate and a long chain diol with the other end of the diisocyanate to form a trimeric polyol with a urethane linkage while maintaining hydroxy functionality in the polyol.

Further, the trimeric urethane polyol "prepolymer" of the present invention including terminal hydroxyl groups is particularly useful as a first component in a two-component coating composition in combination with a polyisocyanate. As such, the terminal hydroxyl groups of the polyol are capable of reacting and polymerizing with a separate polyisocyanate, thus forming a polyurethane polymer as a coating composition having a low viscosity. With respect to the coating composition as claimed in claims 10 and 20, the Office Action contends that Reich teaches that a portion of the water in the reaction mixture can be substituted by an amine, which reacts with isocyanate groups to form a urea, which in turn reacts with another isocyanate to form a biuret. Reich, however, still fails in any way to disclose, teach, or suggest a trimeric hydroxy-terminated polyurethane polyol, let alone a further reaction of such a polyol with a polyisocyanate. Regardless of the alleged teachings of Reich regarding substitution of an amine for a portion of the water in the reaction mixture, there is

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nothing in Reich which would lead one skilled in the art to react a diisocyanate with an aliphatic diol and a polymeric diol having an oxycarbonyl linkage to form a polyol with hydroxy termination, or to thereafter react such a polyol with a polyisocyanate.

Moreover, through the present invention, subsequent reaction of the polyurethane polyol having hydroxy termination with a polyisocyanate results in a coating composition having a low viscosity and high solids content. In fact, such properties are entirely contrary to the polyurethane polymer formed in Reich, whose intent is to produce a composition in the form of a tough gel having a high viscosity.

It is apparent from the above remarks that Reich fails to teach, disclose or suggest the polyurethane polyol of the present invention including hydroxy termination, comprising the reaction product of a diisocyanate with an aliphatic diol and a polymeric diol as claimed, let alone a coating composition as the further reaction product of such a polyol with a polyisocyanate. Accordingly, the rejections based on Reich should be withdrawn.

Based on the foregoing, Applicant respectfully requests withdrawal of the rejections of the claims and favorable reconsideration. Should the Examiner

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wish to discuss any of these issues in further detail, the Examiner is invited to contact Applicant's undersigned representative by telephone at 412-471-8815.

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